WHAT IS CLAIMED IS:

1. A method for generating a user interface, wherein an application program processes data and generates application output and wherein a user interface module processes the application output to generate output data to render on an output device, comprising:

generating output data, with the user interface module, to render on the output device in response to processing statements in the user interface module;

reaching a processing point, with the user interface module, where the user interface module does not include statements to generate output data;

receiving, with the user interface module, an interaction object from the application program specifying data after reaching the processing point; and

generating output data to render on the output device from the interaction object.

2. The method of claim 1, wherein the interaction object further includes attribute information indicating characteristics of the data to output, wherein the output data is rendered in a format corresponding to the characteristics indicated in the attribute information.

3. The method of claim 1, wherein the user interface module comprises a Controller and View and the application program comprises a Model conforming to the Model View Controller architecture.

4. The method of claim 3, wherein the Controller includes the statements that are processed to generate output data, further comprising:

requesting, with the Controller, the interaction object from the Model upon reaching the processing point; and

transferring, with the Controller, the received interaction object to the View, wherein the View generates the output data to render from the interaction object.

5. The method of claim 4, wherein the output data generated by the Model includes questions, further comprising:

receiving, with the View, user input in response to the presented questions;

adding, with the View, the received user input to the interaction object including the output data generated by the View; and

returning the interaction object including the received user input to the Model to process.

6. The method of claim 5, wherein returning the interaction object including the received user input to the Model further comprises:

transmitting, with the View, the interaction object including the answers to the Controller; and

transferring, with the Controller, the Interaction Object including the received user input to the Model.

7. The method of claim 1, wherein multiple user interface modules are capable of generating output data from the interaction object, wherein each user interface module generates the output data to render in a different format.

8. The method of claim 7, wherein each user interface module generates the output data to render on a different type of output device.

9. The method of claim 1, further comprising:

continuing to generate, with the user interface module, output data in response to processing statements in the user interface module after the output data generated from the interaction object is rendered on the output device.

10. A method for generating a user interface, wherein an application program processes data and generates application output and wherein a user interface module processes the application output to generate output data to render on an output device by:

generating output data to render on the output device in response to processing statements in the user interface module;

receiving an interaction object from the application program specifying data to generate as output data;

generating output data to render on the output device from the interaction object from the data specified in the interaction object;

receiving user input in response to the output data rendered on the output device from the interaction object;

adding the received user input into the interaction object; and

returning the interaction object including the received user input to the application program.

11. The method of claim 10, wherein the interaction object further specifies attribute information, wherein the output data is rendered on the output device in a format that corresponds to the specified attribute information.

12. The method of claim 10, wherein the interaction object comprises a plurality of interactions, wherein each interaction includes data to cause the user interface module to render a message or question on the output device.

13. The method of claim 12, wherein each interaction is capable of providing information to cause the user interface module to generate a question that is a member of a set of questions comprising:

a true false question;

an essay question; and

a multiple choice question.

14. The method of claim 12, wherein one or more interactions may include data to render a multiple choice question by providing:

a question string comprising a question presented to the user;

a choice array comprising a plurality of user selectable choices to present as responses to the presented question, wherein the choices in the choice array are presented on the output device with a selection mechanism to enable selection of at least one of the choices; and

a selection array indicating which user selectable choices were selected through the selection mechanism, wherein the selection array comprises the received user input in response to the presented question.

15. The method of claim 14, wherein the interaction including data to render a multiple choice question further includes:

an allowable selection variable indicating a maximum number of user selectable choices that may be indicated as selected in the selection array.

16. The method of claim 10, wherein the user interface module comprises a Controller and View components and the application program comprises a Model conforming to the Model View Controller architecture.

17. The method of claim 10, wherein multiple user interface modules are capable of generating output data from the interaction object, wherein each user interface module generates the output data to render in a different format.

18. The method of claim 17, wherein each user interface module generates the output data from the interaction object to render on a different type of output device.

19. A system for generating a user interface on an output device, comprising:

a computer readable medium;

an application program means for processing data and generating application output;

an interaction object included in the computer readable medium specifying data to generate, wherein the application program means generates the interaction object; and

a user interface module means for generating output data to render on the output device by performing:

(i) processing statements in the user interface module to generate output data to render on the output device;

(ii) reaching a processing point where the user interface module does not include statements to generate output data;

(iii) receiving an interaction object from the application program specifying data after reaching the processing point; and

(iv) generating output data to render on the output device from the interaction object.

20. The system of claim 19, wherein the interaction object further includes attribute information indicating characteristics of the data to output, wherein the user interface module means renders the output data in a format corresponding to the characteristics indicated in the attribute information.

21. The system of claim 19, wherein the user interface module means includes a Controller means and View means and the application program comprises a Model means conforming to the Model View Controller architecture.

22. The system of claim 21, wherein the Controller means includes the statements that are processed to generate output data, wherein the Controller means further performs:

requesting the interaction object from the Model upon reaching the processing point; and

transferring the received interaction object to the View, wherein the View generates the output data to render from the interaction object.

23. The system of claim 22, wherein the output data generated by the Model means includes questions, wherein the View means further performs:

receiving user input in response to the presented questions;

adding the received user input to the interaction object including the output data generated by the View; and

returning the interaction object including the received user input to the Model to process.

24. The system of claim 23, wherein returning the interaction object including the received user input to the Model is performed by:

transmitting, with the View means, the interaction object including the answers to the Controller; and

transferring, with the Controller means, the Interaction Object including the received user input to the Model.

25. The system of claim 19, further comprising: multiple user interface module means capable of generating output data from the interaction object, wherein each user interface module means generates the output data to render in a different format.

26. The system of claim 25, wherein each user interface module generates the output data to render on a different type of output device.

27. The system of claim 19, wherein the user interface module means further performs:

continuing to generate, with the user interface module, output data in response to processing statements in the user interface module after the output data generated from the interaction object is rendered on the output device.

28. A system for generating a user interface on an output device, comprising:

a computer readable medium;

an application program means for processing data and generating application output;

an interaction object included in the computer readable medium specifying data to generate, wherein the application program means generates the interaction object; and

a user interface module means for generating output data to render on the output device by performing:

(i) receiving the interaction object specifying data to generate as output data;

(i) generating output data to render on the output device from the interaction object from the data specified in the interaction object;

(ii) receiving user input in response to the output data rendered on the output device from the interaction object;

(iii) adding the received user input into the interaction object; and

(iv) returning the interaction object including the received user input to the application program.

29. The system of claim 28, wherein the interaction object further specifies attribute information, wherein the output data is rendered on the output device in a format that corresponds to the specified attribute information.

30. The system of claim 28, wherein the interaction object comprises a plurality of interactions, wherein each interaction includes data to cause the user interface module means to render a message or question on the output device.

31. The system of claim 30, wherein each interaction is capable of providing information to cause the user interface module means to generate a question that is a member of a set of questions comprising:

a true false question;

an essay question; and

a multiple choice question.

32. The system of claim 30, wherein one or more interactions may include data to cause the user interface module means to render a multiple choice question by providing:

a question string comprising a question presented to the user;

a choice array comprising a plurality of user selectable choices to present as responses to the presented question, wherein the choices in the choice array are presented on the output device with a selection mechanism to enable selection of at least one of the choices; and

a selection array indicating which user selectable choices were selected through the selection mechanism, wherein the selection array comprises the received user input in response to the presented question.

33. The system of claim 32, wherein the interaction including data to render a multiple choice question further includes:

an allowable selection variable indicating a maximum number of user selectable choices that may be indicated as selected in the selection array.

34. The system of claim 28, wherein the user interface module means comprises a Controller and View components and the application program means comprises a Model conforming to the Model View Controller architecture.

35. The system of claim 28, wherein multiple user interface module means are capable of generating output data from the interaction object, wherein each user interface module means generates the output data to render in a different format.

36. The system of claim 35, wherein each user interface module generates the output data from the interaction object to render on a different type of output device.

37. An article of manufacture including code for generating a user interface, wherein the code includes an application program that processes data and generates application output and a user interface module that processes the application output to generate output data to render on an output device by:

generating output data to render on the output device in response to processing statements in the user interface module;

reaching a processing point where the user interface module does not include statements to generate output data;

receiving an interaction object from the application program specifying data after reaching the processing point; and

generating output data to render on the output device from the interaction object.

38. The article of manufacture of claim 37, wherein the interaction object further includes attribute information indicating characteristics of the data to output, wherein the output data is rendered in a format corresponding to the characteristics indicated in the attribute information.

39. The article of manufacture of claim 37, wherein the user interface module comprises a Controller and View and the application program comprises a Model conforming to the Model View Controller architecture.

40. The article of manufacture of claim 39, wherein the Controller includes the statements that are processed to generate output data, and wherein the Controller further performs:

requesting ,the interaction object from the Model upon reaching the processing point; and

transferring the received interaction object to the View, wherein the View generates the output data to render from the interaction object.

41. The article of manufacture of claim 40, wherein the output data generated by the model includes questions, further comprising:

receiving, with the View, user input in response to the presented questions;

adding, with the View, the received user input to the interaction object including the output data generated by the View; and

returning the interaction object including the received user input to the Model to process.

42. The article of manufacture of claim 41, wherein returning the interaction object including the received user input to the Model further comprises:

transmitting, with the View, the interaction object including the answers to the Controller; and

transferring, with the Controller, the Interaction Object including the received user input to the Model.

43. The article of manufacture of claim 37, wherein multiple user interface modules are capable of generating output data from the interaction object, wherein each user interface module generates the output data to render in a different format.

44. The article of manufacture of claim 37, wherein each user interface module generates the output data to render on a different type of output device.

45. The article of manufacture of claim 37, further comprising:

continuing to generate, with the user interface module, output data in response to processing statements in the user interface module after the output data generated from the interaction object is rendered on the output device.

46. An article of manufacture including code for generating a user interface, wherein the code includes an application program that processes data and generates application output

and a user interface module that processes the application output to generate output data to render on an output device by:

generating output data to render on the output device in response to processing statements in the user interface module;

receiving an interaction object from the application program specifying data to generate as output data;

generating output data to render on the output device from the interaction object from the data specified in the interaction object;

receiving user input in response to the output data rendered on the output device from the interaction object;

adding the received user input into the interaction object; and

returning the interaction object including the received user input to the application program.

47. The article of manufacture of claim 46, wherein the interaction object further specifies attribute information, wherein the output data is rendered on the output device in a format that corresponds to the specified attribute information.

48. The article of manufacture of claim 46, wherein the interaction object comprises a plurality of interactions, wherein each interaction includes data to cause the user interface module to render a message or question on the output device.

49. The article of manufacture of claim 48, wherein each interaction is capable of providing information to cause the user interface module to generate a question that is a member of a set of questions comprising:

a true false question;

an essay question; and

a multiple choice question.

50. The article of manufacture of claim 48, wherein one or more interactions may include data to cause the user interface module to render a multiple choice question by providing:

a question string comprising a question presented to the user;

a choice array comprising a plurality of user selectable choices to present as responses to the presented question, wherein the choices in the choice array are presented on the output device with a selection mechanism to enable selection of at least one of the choices; and

a selection array indicating which user selectable choices were selected through the selection mechanism, wherein the selection array comprises the received user input in response to the presented question.

51. The article of manufacture of claim 46, wherein the interaction including data to cause the user interface module to render a multiple choice question further includes:

an allowable selection variable indicating a maximum number of user selectable choices that may be indicated as selected in the selection array.

52. The article of manufacture of claim 46, wherein the user interface module comprises a Controller and View components and the application program comprises a Model conforming to the Model View Controller architecture.

53. The article of manufacture of claim 46, wherein multiple user interface modules are capable of generating output data from the interaction object, wherein each user interface module generates the output data to render in a different format.

Express Mail No. EL821158289US
Docket No. P6144
Firm No. 0045.0021

54. The article of manufacture of claim 53, wherein each user interface module generates the output data from the interaction object to render on a different type of output device.